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Mill Company, Boston

CATALOGUE NO. 65

CRUSHING ROLLS

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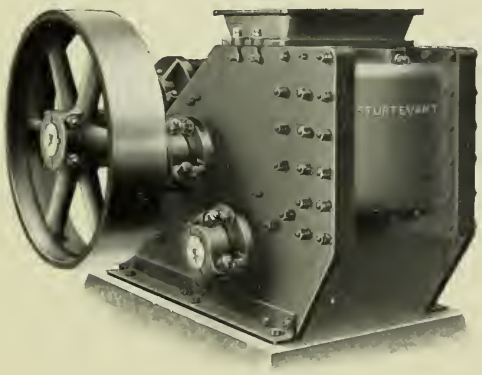
STURTEVANT

Crushing and Grinding Machinery



Patented

STURTEVANT MILL CO.

MANUFACTURER AND DEALER.

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CATALOGUES

THE LARGEST LINE OF ROCK AND ORE

Crushing, Granulating, Pulverizing, Grinding and Screening Machinery Built

From which may be selected machines of the best types applicable to every material and condition.

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IMPORTANT

Machines, conditions, and materials, vary so greatly that we request as complete information as possible when asked for quotations. Then we can answer intelligently, and specify the size and type of machine best suited to requirements:—

INFORMATION REQUESTED

What MATERIAL (to be handled): its CONDITION (wet or dry): its CHARACTER (hard or soft): its SIZE (before feeding to machine): the FINENESS of product wanted: the CAPACITY required in tons per HOUR: what MACHINES ARE NOW BEING USED.

TESTING ROOM

This department is thoroughly equipped with constructions of *full size*, and tests *opinions* as well as *machines*. Patrons bring all sorts of material to be reduced, and decisions are frequently made of great importance. The output and adaptability of any machine need seldom be a matter of doubt, because tests here can be made as thoroughly as required.

Samples sent will be reduced *free* if transportation is prepaid. Manufacturers do well to come themselves or send a representative to make tests.

BALANCED ROLLS

LIKE other effective machines, Rolls are best designed for special purposes: then if intelligently used, they cannot fail to give satisfaction.

STURTEVANT ROLLS

are therefore made for *coarse*, and also for *finest* work. They are also *balanced.*

Balanced Rolls are those in which the shocks of rock crushing balance and offset each other. These Rolls run, as will be noted (in later pages) with only *one quarter* of the vibrations of other machines of this class, and for this reason can run faster and last longer than others, and do more work in the same time.

BALANCED ROLLS

BALANCED ROLLS are different from all others, combining the best features of *Spring* and *Rigid* types with the faults of neither. They are Rigid to all *ore*, giving the uniformly fine product of Rigid Rolls, yet they are able to give instant relief to prevent breakage, should iron or other uncrushable material get between the tires. No throwing of belts, caused by overfeeding, as in Rigid constructions, and they are not subject to the shocks caused by excessive reciprocation, as in ordinary Spring Rolls.

Springs are placed back of all four bearings, allowing *each* to spring back in relief, *equally* and *oppositely* at the same time, thus exactly balancing and off-setting each other. These springs act only as a *safety*, like the breaking piece in Crushers; and they are stiff enough to crush the hardest ore, yet flexible enough to prevent accidents. The pedestals are *rigid*, allowing a few parts only to reciprocate. A shaft has never broken because there are no crystalizing shocks.

Special car-box bearings are used, the same as on railway cars, and are dust-proof. The Roll heads or hearts are not removed in replacing tires, and the shells may be kept true without being removed by means of our special "Rapid Tire Turning Device."

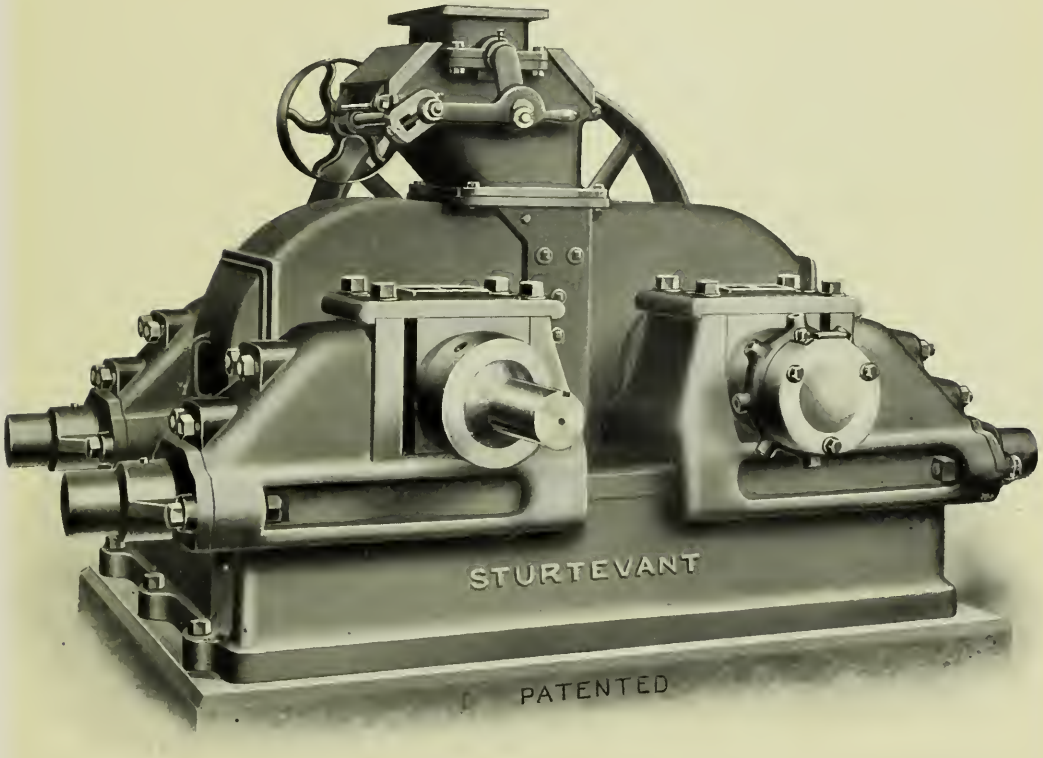
The above are only a few of the many special features that are found in these but in no others.

The Adjustments are automatic—no shims—and cannot be made wrong. The Roll discharge is always in the same place; thus the shields are never moved. Every part has been designed for simplicity, accuracy of output, and the convenience of the operator; no other Roll is in the same class.

It is sometimes objected to *sprung* Rolls that their outputs contain too much oversize, which requires to be screened out and returned at considerable cost. *All this is true*, and to cure this fault some makers attempt absolutely *rigid*, *springless* rolls. Such cannot separate and let out *oversize, or in fact anything else*, consequently if an uncrushable substance gets between the roll faces, the machine must *break* or *stop*. Great care, too, must be exercised that the feed is not in excess, or *breakage* or *stop* is inevitable. A safety breaking piece has been used by a few makers, but this breaks *too often* if the design is *safe*, and if too strong to be safe the roll frame or shafts suffer, or the machine is stalled. It is not surprising, therefore, that these conditions have generally soon led to the abandonment of rigid rolls.

There is one advantage the *springless* rigid roll can claim—it is *cheap*. And only one objection — that it is *absolutely rigid*. It is called upon to *resist the irresistible*. It always runs *hard*; and on most materials with hot bearings, and often attains a bent or broken shaft, and not infrequently, unless it *stops*, a *broken back*. *Balanced Rolls have as much inflexibility as is useful or safe.*

BALANCED ROLLS



36 in. x 16 in. Balanced Rolls.

Crushing shocks **quartered.**

Notice the massive and simple construction.

Adjustment *automatic* and cannot be wrong.

BALANCED ROLLS

NOT NEEDED.

IT would be serious indeed if it were necessary to produce *springless rolls* in order to obtain desirable *rigidity;* but, fortunately, *rigidity* can also be had *with springs*, and as much rigidity as is wanted. It is only a question of spring *size*. The *massive* springs of Balanced Rolls are *inflexible to any rock*. They crush the strongest with ease. These spring rolls are built to endure the hardest work; *no rock can open them;* consequently they do not release more *oversize* than do rolls that *cannot open* at all even to release materials that are *uncrushable*, or that if overfed must *stall* or *break* the machine.

Balanced Rolls are designed to be *rigid for every useful purpose*, and no argument is needed to establish the importance of *rigid spring* construction; but *springless* Rolls are only rigid *until they break*, while Balanced Rolls are always *rigid* until the time comes when they *must* either *retreat* or *break*, and then they *do not break*.

DEFINITION OF BALANCED ROLLS.

BALANCED ROLLS are those in which all the *shock* movements of crushing are made in *opposite* directions at the *same speed*, at the *same time*, and with *equal force;* these movements thus exactly *counteract* and *offset* each other.

DESIGN.

They are designed on the following principles: —

1st: that the *fewest possible parts shall make shock movements;*

2d: that the *speed* of parts moving to shock *shall be low;*

3d: that parts moving *oppositely* shall have *equal weight;*

4th: that parts moving *oppositely* shall have *equal speed;*

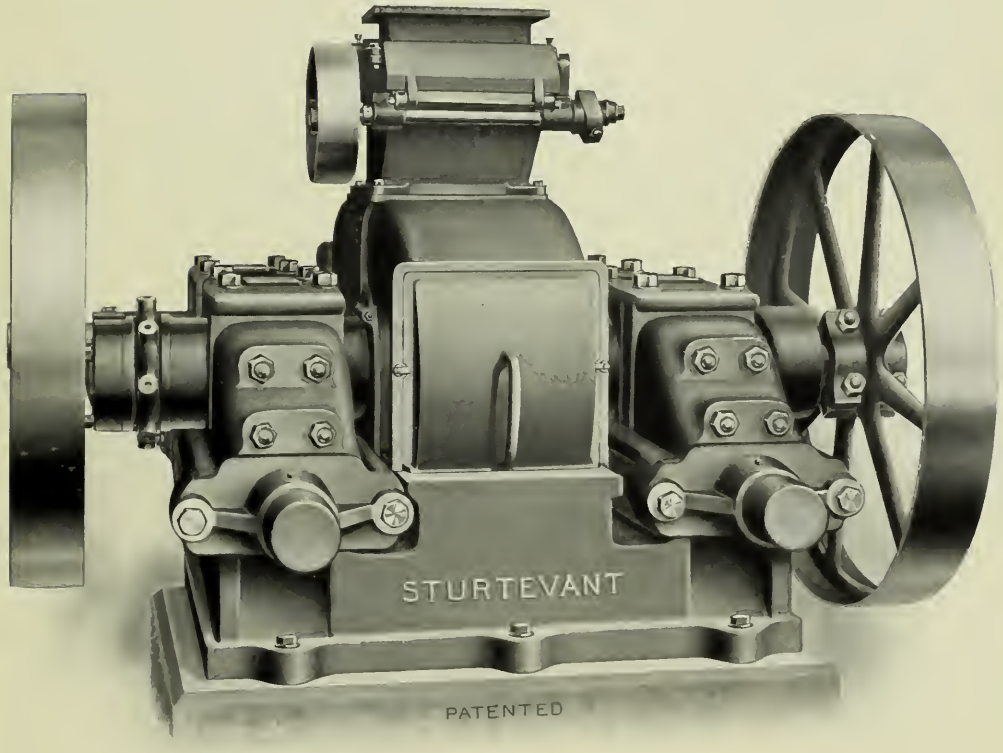
5th: that opposite movements shall be made at the *same time;*

6th: that such shocks as are unavoidable shall be *cushioned by springs*.

We believe our engineering friends agree that by building on these new features of Roll design we have introduced types remarkable for *durability* and *easy running*.

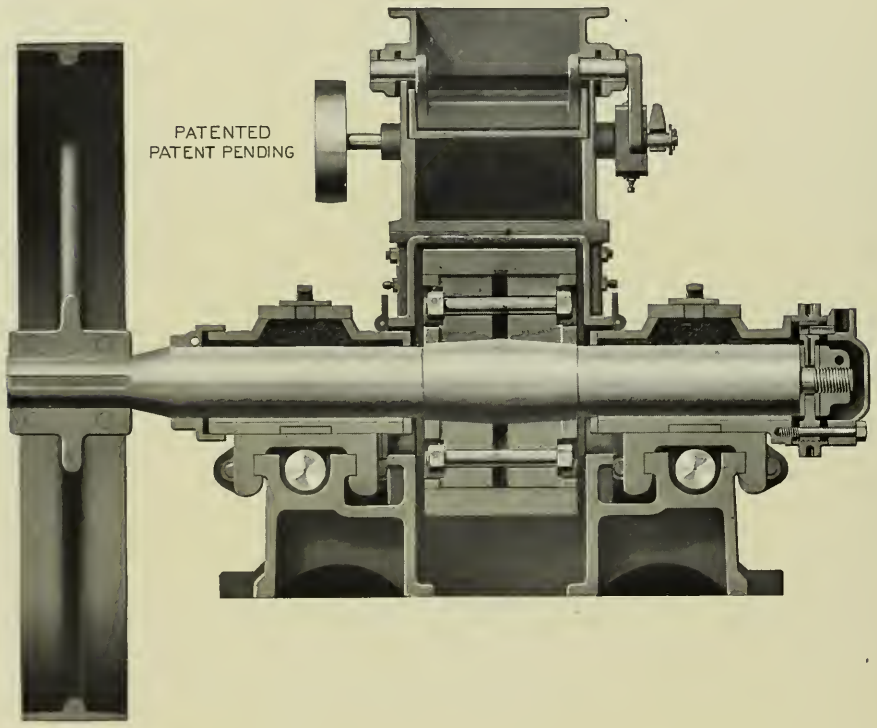
Each point described appeals to the common sense of every reader.

BALANCED ROLLS



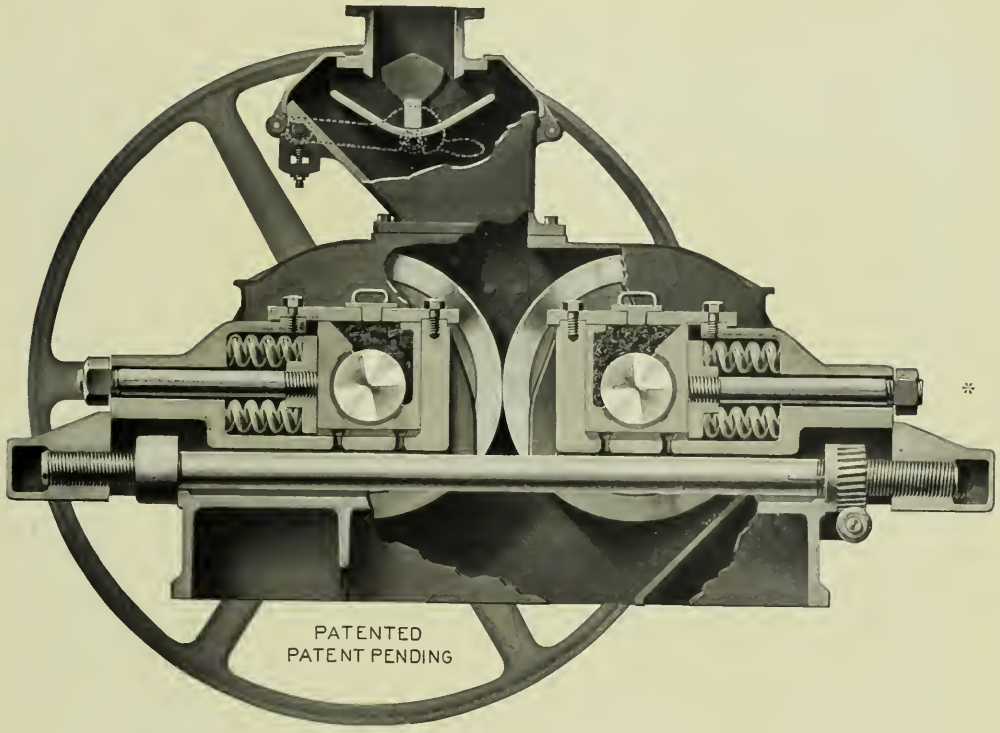
36 in. x 16 in. Balanced Rolls.
The shells never need be removed until worn out
because they can be turned up *in place.*

BALANCED ROLLS



26 x 15 Balanced Roll. (End View.)
Showing its simple massive construction, side and end adjustments, perfect automatic feeder, etc.

BALANCED ROLLS



26 x 15 Balanced Roll (Side View).

A Roll built, like the others, for the hardest use.

Notice that springs are placed behind each car-box bearing, causing all crushing shocks to be exactly balanced.

*These nuts are removed when the roll is in use, or backed far away from the pedestal. They are only needed to pull back the springs to permit removal of car-box bearings and shaft.

BALANCED ROLLS

DESCRIPTION.

THE massive bed frame carries on the top side heavy sliding pedestals that are tied together in pairs, and each pedestal screwed *to* or *from* the other by the revolution of a massive screw *tie-rod*. The pedestal screw tie-rods are made to turn at the same time (and each draws its pair of pedestals together, or forces them apart) by a worm-geared cross shaft actuated by hand.

The pedestals carry the roll shaft in *car-box* bearings, and by screwing the pedestals together, or apart, the crushing distance between the Rolls is regulated with exactness. The discharge is always at the same point.

The shaft bearings carried in the pedestals are of the *car-box type*, and the springs that hold each box bearing in place and that receive the shock of crushing, are placed in recesses in the *back* of each pedestal. A removable steel plate under the car-box, *protects the pedestal* from wear. *The pedestals never move, except to adjust the roll distances.*

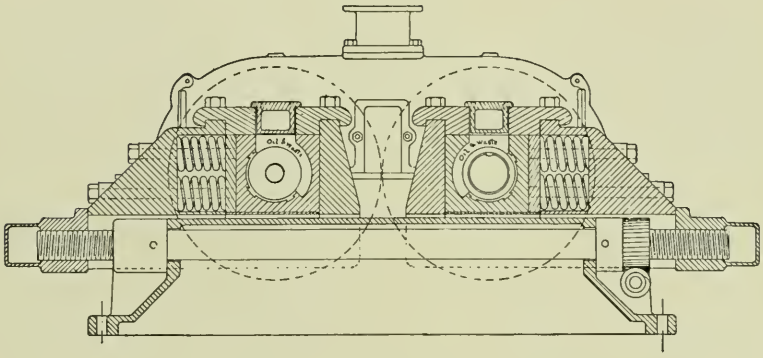
All shocks produced in crushing rock are *absorbed* and cushioned by the pedestal springs. The shafts are *elastically held* by the car-box bearings, just as in a railway car, and the axles cannot by any possibility be *cramped.* The bearing car-box has a pocket filled with waste and oil (as in a car-bearing), and thus perfectly *protected from dust.*

It will be noticed that the nuts, on the powerful spring bolts in the pedestal heads, when turned *up* compress the car-box springs so that the *car-box bearing* can be quickly slipped off the shaft when it is necessary to remove the shaft to replace a tire; but these nuts *should be removed when* the rolls are running, because they are only *nuts to compress the springs* when the car-box bearing is to be removed from the pedestal.

When rocks are introduced between STURTEVANT ROLLS it is seen that all the Roll movements are *oppositely* made—at the *same time*—and because the corresponding parts are all of equal weight, and moving oppositely at the same speed, they *exactly counteract* and *balance* and offset each other.

Note:—Remember Sturtevant Roll tires may be kept perfectly true by *turning* in place with a lathe tool.

BALANCED ROLLS



Patented

SHOCKS QUARTERED.

It has been shown that in these Rolls the shocks that are unavoidably produced are QUARTERED :—that is, they are made with only *one-quarter* the usual force.

WHY?

In view of its *importance*, we venture to state again that it is because the opposite Roll-heads are *both* made to move apart *equally* under excessive stresses; therefore each roll moves only *half as far* as in other rolls; for usually one Roll is *fixed* on the frame, and the other (with its *massive* pedestal) *makes all the moves*. A common Roll shaft bearing consequently has to go *twice as far in the same time: i.e. twice as fast*. The shock of this *longer* and *more rapid* movement equals the *mass* multiplied by the *square* of the velocity (MV^2); this figures FOUR; hence the shocks suffered by STURTEVANT BALANCED ROLLS (moderately stated) are of only one-quarter the usual severity. But they are really greatly less than this—because a Balanced Roll *does not carry its heavy pedestal with it* when it reciprocates, as do all rolls of common type. Even if STURTEVANT ROLLS were not *balanced* their freedom from shocks would give them great advantage over others—because the moving parts are of less weight—but balancing even reduced masses—intensifies these good points that so importantly increase *durability*.

ADJUSTMENTS.

No *shims* are used in adjusting these STURTEVANT ROLLS; the large *screw* tie-rods regulate the distance apart, and *hold* the Rolls against any pressures. This adjustment, being *automatic*, can never be wrong. The tire faces are *sure to be parallel*.

BALANCED ROLLS

SIDE PLATES.

Because *both* Rolls move *equally* apart, or together, the *crushing line* never varies, and *no change of position of the side plates* is required.

CAR-BOX ELASTIC BEARINGS.

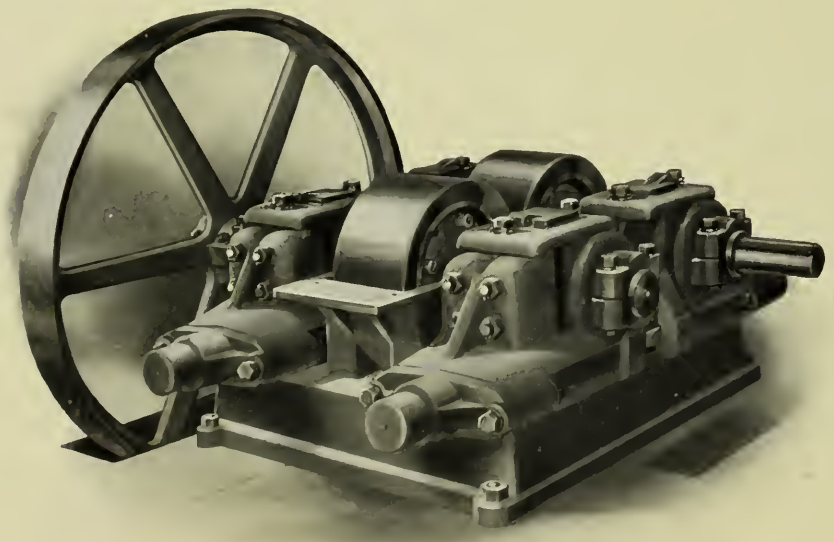
Too much cannot be said in praise of *this* improvement in Rolls. "The car-box is certainly the most reliable bearing known to mechanics. It requires the least attention, *endures the hardest usage*, withstands safely, and *cushions* the heaviest shocks, and is *dust-proof*. It is also *flexible* to the shaft movements. The car *box* is *cushioned* by the heavy pedestal springs, exactly as in a railway car, and the shocks softened in an equal degree.

This is a distinctively Sturtevant design, and we are proud of it. The *car-box* on railway axles operating under most trying conditions of *shock* and *dust*, has superseded all other bearing devices, and it is no less effective in Rolls.

NO PEDESTAL WEAR.

The bearing boxes rest on *renewable* steel plates, and since the heavy pedestals do not reciprocate on the frame, as in common Rolls, there is no *wear* on the grooved pedestal seats or the Roll frame. In other constructions the wear of these expensive parts is frequently serious.

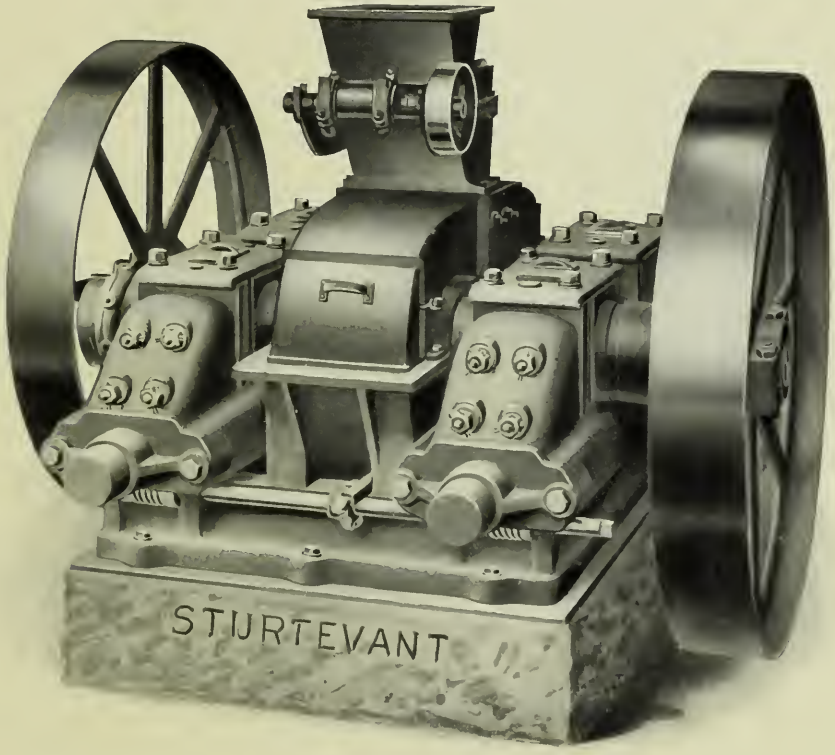
The tires of Sturtevant Rolls may always be kept true by turning up *in place* with a lathe tool.



Patented

21 in. x 10 in. Balanced Rolls with case and feeder removed.

BALANCED ROLLS



Patented

32 in. x 16 in. Balanced Rolls.

Crushing shocks **quartered.**

Notice the massive and simple construction.

Adjustment *automatic* and cannot be wrong.

BALANCED ROLLS

THE CAR-BOX BEARINGS.

*

Patented

PEDESTAL SPRINGS.

These massive pedestal springs crush any rock whatever, and even roll out ordinary iron or steel. But *no breaking piece* is required to save the shafts or bearings or frame, and because no rock can force the rolls apart, absolutely rigid rolls cannot give a product more free from *oversize*.

CHANGING TIRES EASY.

As before stated, removing the pedestal caps, and turning up the nuts on the tension bolts of the pedestal springs, releases the *car-box ;* and *then* the shaft and box may be lifted out. The tire is then easily removed from the head. But when the rolls are in use, the *nuts* on the tension bolts must be *turned back* or *removed*.

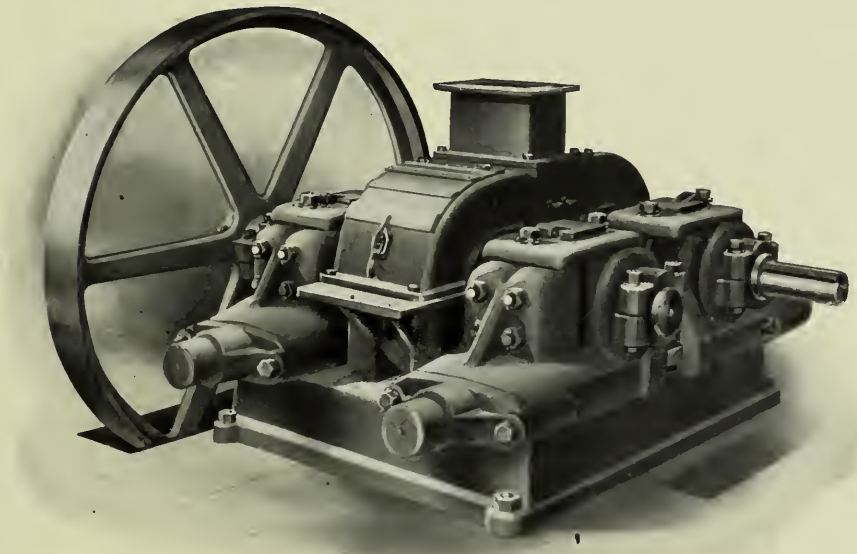
HEARTS.

The new expanding heart is an improvement worthy of these high class rolls. This also is a Sturtevant invention of note. The *shaft* is tapered, instead of the *roll shell* as in others, thus permitting the shell or tire to be replaced without removing the heart. By using the set screws supplied with the Rolls, the expanding hearts are loosened, and the shells may be easily slipped off or on. The shells are held firmly in position by setting up on the through bolts, and never loosen.

We go into no details to describe the excellent workmanship and materials of these machines, for they are Sturtevant productions ; but we believe every engineer examining them will admit that STURTEVANT ROLLS are the first to embody in their design *up-to-date* constructive science. It seems clear that they ought to be better than any other Rolls—and they surely are. No others are in the same class.

* These nuts are removed when rolls are in use, or backed far away from the pedestal.

BALANCED ROLLS



Patented

21 x 10 Balanced Rolls with wet feeder.

All Sturtevant Rolls are capable of the hardest work.

It should be noted—that although *balanced rolls* are *rigid* to all rock in crushing—because of the unusual strength of the springs generally preferred. It is yet clear that lighter springs can be supplied to any parties desiring to try Balanced Rolls with *common springs*. They will then do *ordinary work*—but with incomparably less *shock* and *pound* and can consequently run faster and do much more than others—and still be far more *durable*.

BALANCED, AND LABORATORY ROLL SPECIFICATIONS.

Code Word	Size in.	Pulley in.	Approx. Horse Power	Speed r.p.m. *	Approx. Length	Approx. Width	Height with Fly Wheel Approx.	Approx. Weight of heaviest piece	Approx. Weight Nett	Approx. Weight Gross
Billey	Laboratory 8 x 5	18 x 4	1	150	31 in.	28 in.	22 in.		650 lbs.	700 lbs.
Bonnie	Balanced 16 x 10	48 x 5	4	150	5 ft. 9 in.	4 ft.	5 ft.	1450 lbs.	6000 lbs.	7000 lbs.
Ceabo	" 21 x 10	60 x 6	8	125	6 ft. 9 in.	6 ft. 3 in.	5 ft.	1200 lbs.	10000 lbs.	12500 lbs.
Ceaden	" 26 x 15	66 x 10	10	100	8 ft.	8 ft.	5 ft.	2000 lbs.	16000 lbs.	19000 lbs.
Ceasel	" 32 x 16	72 x 10	15	90	9 ft. 4 in.	9 ft. 1 in.	6 ft.	3500 lbs.	30000 lbs.	33000 lbs.
Ceatry	" 36 x 16	72 x 10	18	80	10 ft.	10 ft.	6 ft. 6 in.	4000 lbs.	32000 lbs.	35000 lbs.
Ceavon	Geared 40 x 20	42 x 12	25	60	10 ft.	10 ft.	6 ft.	7000 lbs.	40000 lbs.	44000 lbs.

*The Speed of Rolls vary according to size and kind of material.

Subject to change without notice.

CENTRIFUGAL ROLLS

CENTRIFUGAL ROLLS.

THESE are special machines only adapted to certain classes of reduction. They are recommended for finishing, or very fine crushing on soft or moderately hard materials. They are capable of great outputs.

The tires are of narrow face and comparatively large diameters; thus enormous crushing pressures are brought to bear on a narrow surface running at high speed. As narrow tires may be kept *true* easier than wide ones the product of these Rolls is more uniform and contains more fines than any other.

In construction Centrifugal Rolls are similar to the Balanced Rolls, although the crushing shocks are even more perfectly balanced. The *tires only* reciprocate, and these are cushioned by nests of powerful springs *within the heads*, and *behind* the tires.

Centrifugal Rolls can run fast, and produce a large amount of finely-crushed ore.

In these, *cushioned tires* do all the work. The heads, shafts, bearings, pulleys—in fact all the *heavy* parts—are *fixed* in position, and therefore run quietly.

TIRES MOVE APART.

The *tires* can *each* move apart, one from the other; but no rock can *force* them apart without being crushed between them. *The roll* HEADS *do not move back*, but are *rigid*.

SHOCKS ARE DIVIDED.

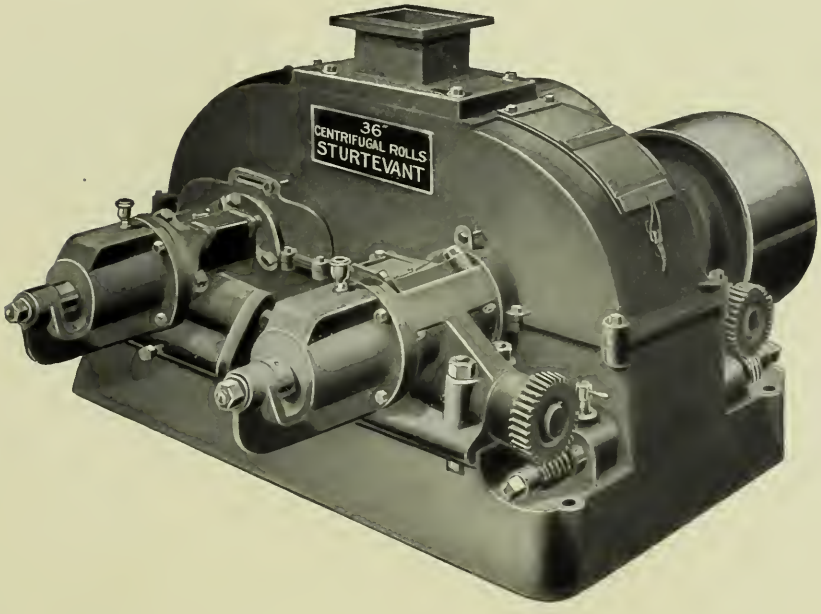
Since the tires *both* move apart, *each* moves only *half as far* as the single free head of a common roll. Destructive common roll shocks are therefore eliminated. Conditions all favor durability, and the reason why Centrifugals can attain higher tire velocities and run far easier than any other rolls, is clear.

SPECIFICATIONS—CENTRIFUGAL ROLLS.

Code word with automatic Feeder	Sizes Diam. Face inches	Pulley Dia. and Face inches	Estimated H. Power average	Length	Width	Height with Feeder approx.	Approx. Weight of heaviest piece	Approx. Weight Nett.	Approx. Weight Gross
Cahilan	26 x 4½	18 x 10	8	6 ft. 0 in.	5 ft. 6 in.	4 ft. 2 in.	1300 lbs.	7500 lbs.	8000 lbs.
Cahoxen	36 x 6	28 x 12	15	7 ft.	7 ft. 3 in.	5 ft. 4 in.	3000 lbs.	16000 lb.	18000 lb.

Subject to change without notice.

CENTRIFUGAL ROLLS

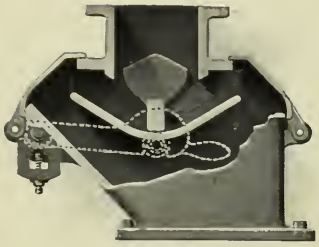


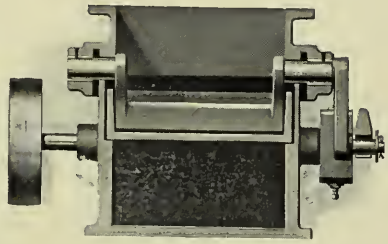
Patented

36 in. x 6 in. Centrifugal Rolls with wet feeder.

Centrifugal Rolls have only *one* belt and small pulley.

AUTOMATIC FEEDERS





(Patent applied for)

IMPROVED FEEDERS.

The above illustrations show our improved Automatic Feeders (also a Sturtevant invention) for Rolls, or any machine requiring an even amount of material. It is simple in operation, durable, the adjustments are perfect and easily get-at-able. The parts are few and quickly and cheaply replaced.

OPERATION.

A scraper moving parallel to a curved pan, *both replaceable*—are its active parts. The material is fed through the hopper upon the curved replaceable pan, from which it is swept off at each end alternately, the same amount at either end resulting in a continuous even feed upon which a machine can do its best work.

The feed is regulated by a variable throw crank, actuated by means of a connecting-rod to a lever directly connected to the scraper. By lifting this connecting-rod by its handle the feed is instantly stopped.

At either end of the feeder doors open, allowing a complete inspection of its interior, even when running, to observe the quantity and distribution; also the exact setting of the rolls may be seen from these points.

Weight, approx., net 500 lbs.; gross 600 lbs. Code Word: "Dabque."

CRUSHING ROLLS

STANDARD DESIGNS.

Much machinery is now built sectional; that is capable of being knocked down so that no part weighs over 300 to 350 pounds, for mule-back or even transportation by man.

Besides sectional Rolls we have to offer Blake Crushers, Dodge Crushers, Roll Jaw Crushers, Huntington Mills and Stamp Mills.

STANDARD SECTIONAL ROLLS.

Code Word	Size of Rolls	Pulley In.	Approx. H. Power	Speed* r. p. m.	Approx. Weight Heaviest Piece, lbs.	Approx. Weight Complete lbs. net	Approx. Weight Complete lbs. gross
Sectare	12 x 12	48 x 8	4	150	350	3600	4200
Sectary	16 x10	48 x 5	4	150	350	5000	6000
Sectong	20 x 12	60 x 10	5	120	350	6500	7500
Sectkon	27 x 14	80 x 12	10	100	350	13000	15000

*The speed of Rolls varies according to the size of material fed.

Subject to change without notice.

SPECIAL ROLLS

(Patent applied for)

16 x 10 Special Rolls with Automatic Feeder. (Sectional.)

STURTEVANT *SPECIAL* ROLLS are made in one size only—16 in. x 10 in. No parts of which weighs over 350 pounds. They are similar in most respects to Balanced Rolls, and intended for the same class of crushing.

These machines have the Sturtevant patent "car-box" bearings, with an unusually large surface to resist the shocks of crushing.

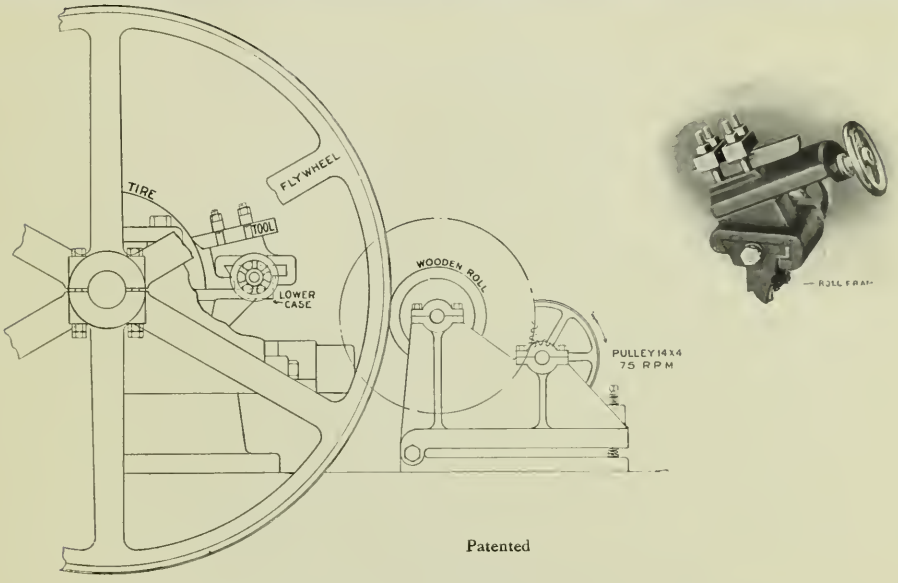
The distance between the Roll tires is regulated by adjusting the stationary Roll. The lateral adjustment is the same as the 21 in. x 10 in. Balanced Rolls.

The feeder is the same as used on Balanced Rolls and is of the latest and most improved type (see page 21).

The arrangement for removing the shells is particularly convenient, as the *hearts* are not removed from the shaft. The shells are bored straight; the taper *is on the shaft.* By screwing up the locking bolts, the hearts *expand* and grip the tire with great force. By loosening these bolts, the hearts contract, leaving the shell loose for quick and easy removal. *This* improvement is so important that we intend to apply it to all Sturtevant Rolls.

The oiling arrangements, the protection of the bearings from dust are unusually perfect, and while this is really a small Roll, yet it is equal to the hardest work under severe conditions of dust and dirt. **For Specifications see page 19.**

ROLL SHELL TURNING DEVICE



Patented

Rapid Shell Turning Device For Crushing Rolls.

The shells or tires of all rolls are inclined to *hollow, grove* and *flange;* and this frequently cannot be avoided, even under skilled management. As the width of a shell is increased uneven wear is more serious, for when out of face a wide shell is surprisingly inefficient,

Intelligent users of rolls for fine work turn the shells *occasionally*, although it is known that this *operation* should be *frequent*. But it is a formidable undertaking to remove belts and dismantle common heavy rolls, and then carry these massive parts to a large and expensive lathe. The shells should be so *hard* as to require a lathe of power, and unusually slow cutting speed; and the tool should be of special air-hardened steel. Soft shells turn easier, but are sooner out of face again.

The replacement and re-adjustment of the roll in its frame is not less troublesome than its taking out; both requiring a gang of men with hoist appliances. It is not therefore singular that rolls are often allowed to run as long as they will, rather than increase efficiency at the cost of so much *lost crushing time*, and a considerable outlay for hoisting apparatus and labor.

USEFULNESS RECOGNIZED.

The quick appreciation by users of Sturtevant tire-turning attachments emphasizes the importance of this invention. *One man* can now keep a *large plant* of roll shells in perfect face.

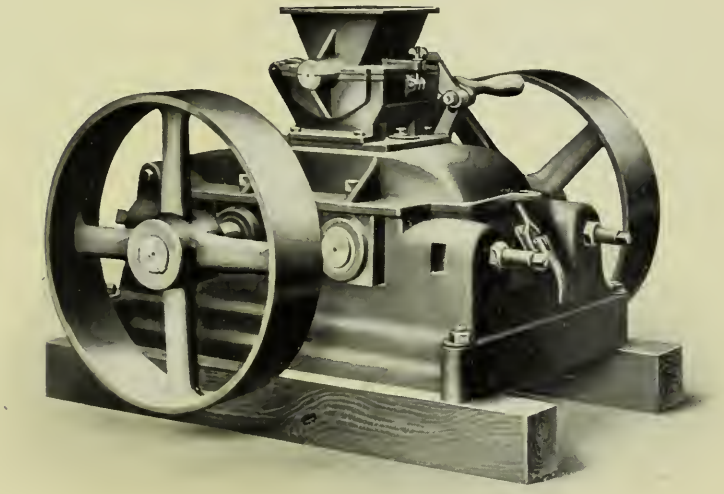
FOR BALANCED ROLLS.

Approx. Dimensions—Length, 2 ft. 1 in., Width, 2 ft. 6 in., Height, 2 ft. 6 in.
Approx. Weight, 685 lbs. Code word, *Ctryx*.

FOR CENTRIFUGAL ROLLS.

We supply a similar device for Centrifugal Rolls, Code word *Crisco*.

LABORATORY ROLLS



8 x 5 Sampling Roll (with Automatic Feeder).

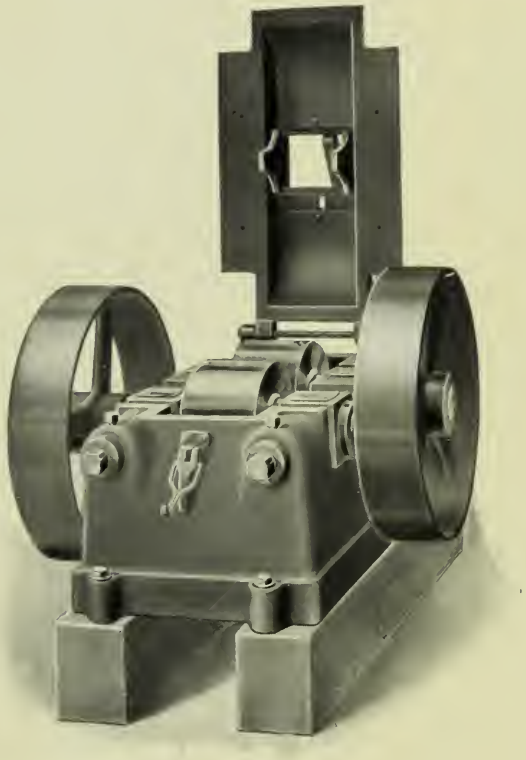
The above illustrates the simplest, heaviest, most accessible and complete laboratory crushing Roll ever built. It is designed for sampling purposes, and is complete ready for belt when shipped.

This little Roll is intended to take ore from Sturtevant Laboratory Crushers and reduce to fine sand rapidly and economically. It requires little power to drive and will run smoothly on any bench or floor.

It is the only first class Sampling Roll that we know of, and is designed to meet the special requirements of assay work.

This solid machine can be regulated for coarse or fine reduction and has adjustable spring pressures, which allows a great variety of output. It is convenient and inexpensive.

LABORATORY ROLLS



Patent applied for

STURTEVANT LABORATORY ROLL

Open for cleaning.

The cover opens as shown and carries the side plates and hopper. Every part is exposed, accessible for cleaning or replacing. This machine is seen to be massive and durable.

Able to do *fine* or *coarse* work, its output, reduced to fine sand, is astonishing. It is capable of taking and crushing hard rock from the Laboratory Crusher to 60 mesh, or finer.

It is practically dust-proof, has our special car-box bearings, and is in all respects as carefully constructed as our large machines.

Our *Automatic Feeder* is supplied with these Rolls and spreads material evenly.

For Specifications of Laboratory Rolls, see page 15.

IMPORTANT.

AS we build such a great variety of machinery, and conditions and materials vary so greatly, we request you to give us the following information as completely as possible when writing for quotations. This will enable us to answer you intelligently, specifying the size and type of machine best suited to your requirements :—

MATERIAL (to be handled)

CONDITION (Wet or Dry)

CHARACTER (Hard or Soft)

SIZE (before feeding to machine)

FINENESS of product wanted

CAPACITY in tons per HOUR

MACHINES you are NOW USING

REMARKS (any special features or other information regarding your work which you think will be of assistance to us.)